

What is claimed is:

sub a<sup>1</sup> 1. A composition of matter comprising a carrier particle; and a DNA sequence coated onto the carrier particle, the DNA sequence comprising a promoter  
5 operative in the cells of a mammal and a protein coding region coding for a determinant of a hantavirus protein.

2. The composition of claim 1 wherein said protein coding region encodes a protein selected from  
10 the group consisting of M gene segment proteins and S gene segment proteins.

sub B<sup>1</sup> 3. The composition of claim 1 wherein said hantavirus is chosen from the group consisting of  
15 Seoul virus, Dobrava virus, Puumala virus, Hantaan virus, Sin Nombre virus, Black Creek Canal virus, Bayou virus, New York virus, Andes virus, and Laguna Negra virus..

4. The composition of claim 3 wherein said hantavirus is Seoul virus.  
20 5. The composition of claim 4 wherein the protein coding region comprises SEQ ID NO:1.

6. The composition of claim 4 wherein the protein coding region comprises SEQ ID NO:2.

sub C<sup>1</sup> 7. The composition of claim 1, wherein said DNA  
25 sequence comprises pWRG-SEO-M.

8. The composition of claim 1, wherein said DNA sequence comprises pWRG-SEO-S.

sub C<sup>2</sup> 9. A method for inducing a protective immune  
30 response to a hantavirus protein in a mammal, comprising  
(i) preparing a nucleic acid encoding a determinant of a hantavirus protein operatively linked to a promoter operative in cells of a mammal;  
(ii) coating the nucleic acid in (i) onto carrier  
35 particles;

(iii) accelerating the coated carrier particles into epidermal cells of the mammal in vivo; and

(iv) detecting a protective immune response in said mammal upon exposure to a hantavirus.

5 10. The method according to claim 9 wherein the carrier particles are gold.

10 11. The method according to claim 9 wherein the protein determinant is chosen from the group consisting of M genome segment proteins and S segment proteins.

sub B-3 12. The method according to claim 9 wherein said hantavirus is chosen from the group consisting of Seoul virus, Dobrava virus, Puumala virus, Hantaan virus, Sin Nombre virus, Black Creek Canal virus, 15 Bayou virus, New York virus, Andes virus, and Laguna Negra virus.

13. The method of claim 12 wherein said hantavirus is Seoul virus.

20 14. The method according to claim 13 wherein said nucleic acid comprises SEQ ID NO:1.

15. The method according to claim 13 wherein said nucleic acid comprises SEQ ID NO:2.

sub B-4 16. The method according to claim 13 wherein said nucleic acid comprises SEQ ID NO: 1 and SEQ ID NO:2.

25 17. A method for inducing a protective immune response to a hantavirus infection in a mammal comprising

30 (i) preparing a nucleic acid encoding a determinant of a first hantavirus protein operatively linked to a promoter operative in cells of a mammal;

(ii) coating the nucleic acid in (i) onto carrier particles;

(iii) accelerating the coated carrier particles into epidermal cells of the mammal in vivo; and

(iv) detecting an immune response in said mammal upon a exposure to a second hantavirus.

18. The method according to claim 17 wherein said first hantavirus is SEOV.

5 19. The method according to claim 18 wherein said second hantavirus is Dobrava virus.

20. The method according to claim 18 wherein said second hantavirus is Hantaan virus.

10 21. The method according to claim 16 wherein said nucleic acid is selected from the group consisting of SEQ ID NO:1 and SEQ ID NO:2.

22. A vaccine against hantavirus infection comprising the composition of claim 3.

15 23. A vaccine against hantavirus infection comprising the composition of claim 4.

24. A vaccine against hantavirus infection comprising the composition of claim 5.

25 25. A vaccine against hantavirus infection comprising the composition of claim 6.

20 26. A multivalent vaccine for protection against infection with more than one hantavirus comprising a composition of matter comprising a carrier particle having one or more DNA sequence coated onto the carrier particle, the DNA sequence comprising a promoter operative in the cells of a mammal and a protein coding region coding for a determinant of a first hantavirus protein said hantavirus selected from the group consisting of SEOV, Dobrava, Pumuula, Hantaan, Sin Nombre virus, Black Creek Canal virus, Bayou virus, New York virus, Andes virus, and Laguna Negra virus.

25 27. The multivalent vaccine of claim 26, further comprising a composition comprising a carrier particle having one or more DNA sequence coated onto the carrier particle, the DNA sequence comprising a

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promoter operative in the cells of a mammal and a  
protein coding region coding for a determinant of a  
second hantavirus different from said first  
5 hantavirus, said second hantavirus selected from the  
group consisting of Seoul virus, Dobrava virus,  
Puumala virus, Hantaan virus, Sin Nombre virus, Black  
Creek Canal virus, Bayou virus, New York virus, Andes  
virus, and Laguna Negra virus.

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